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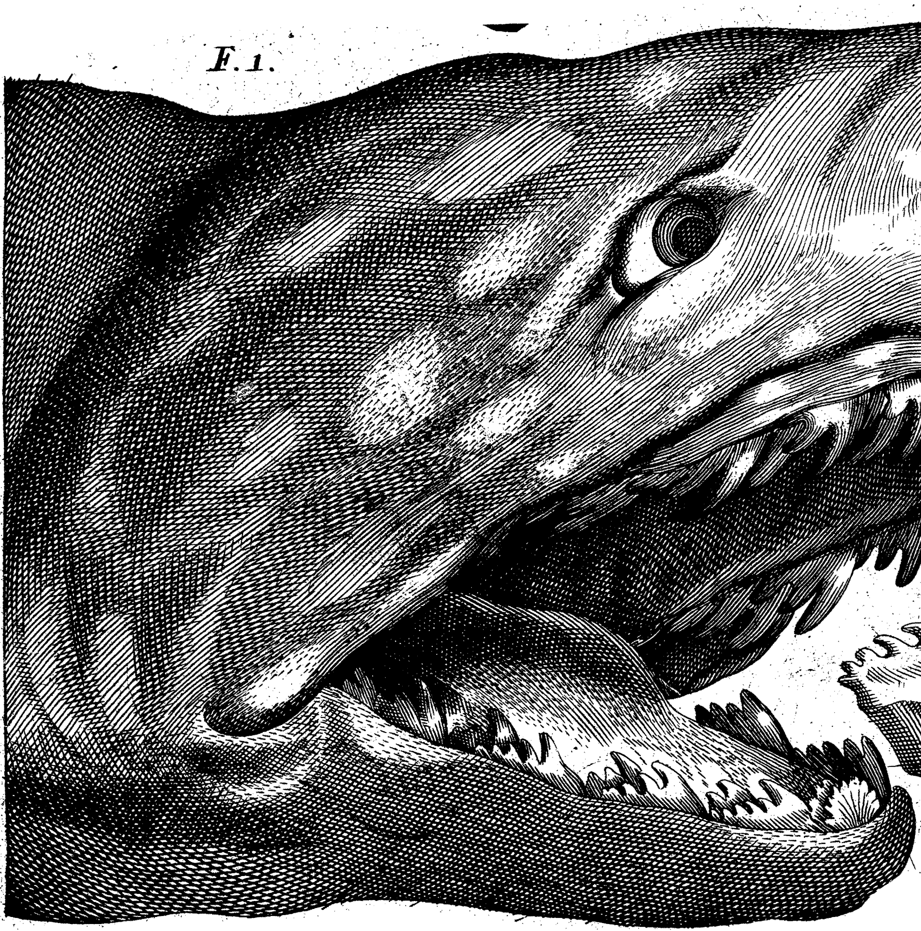

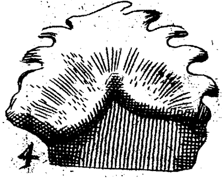

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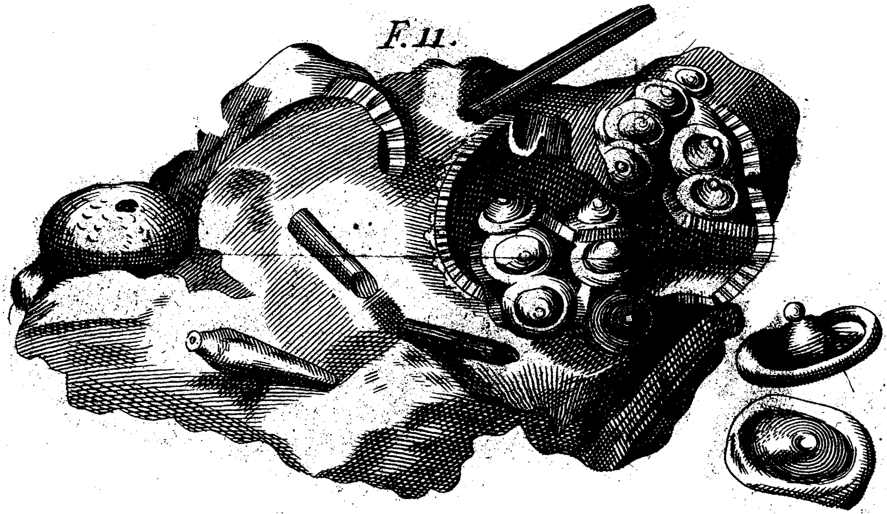

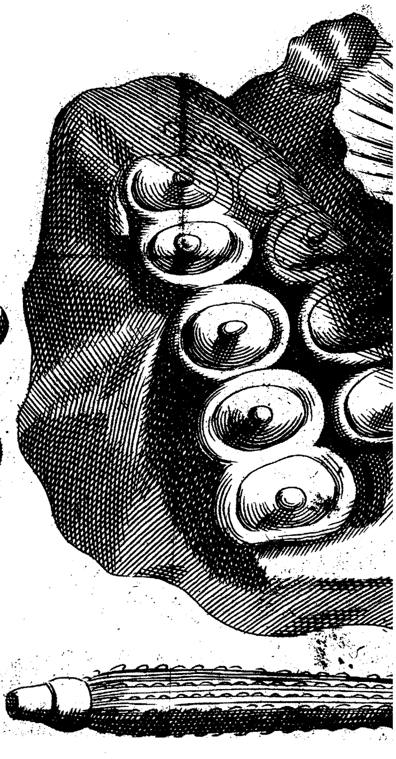

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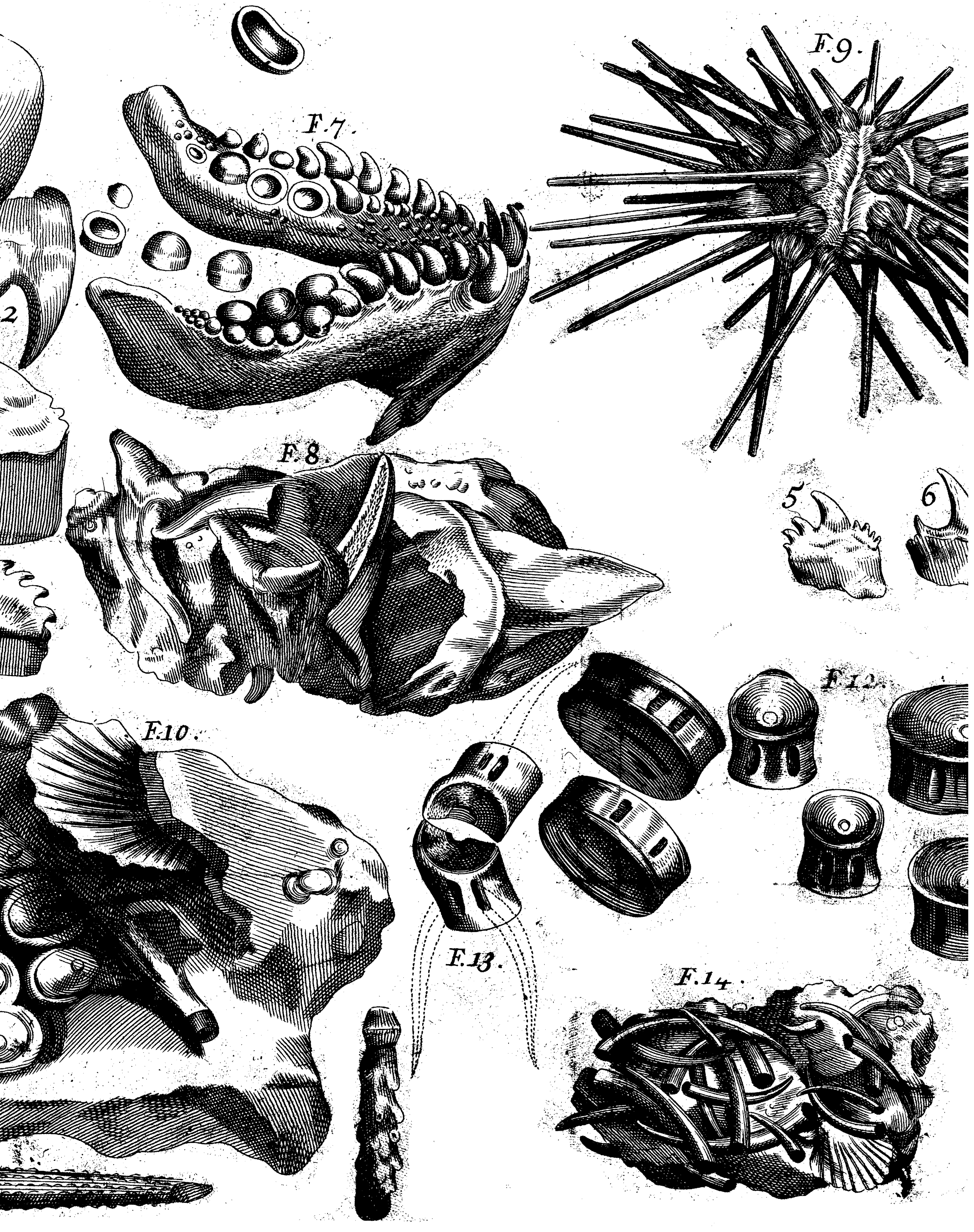
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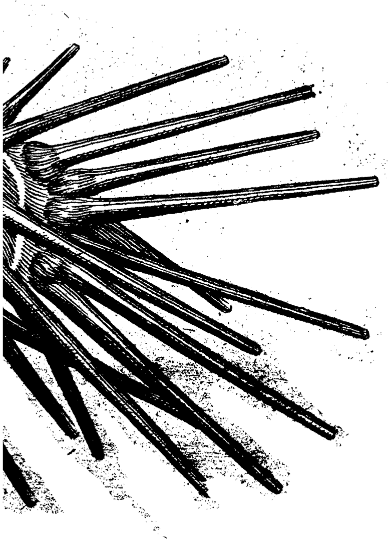

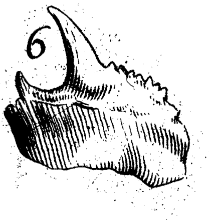
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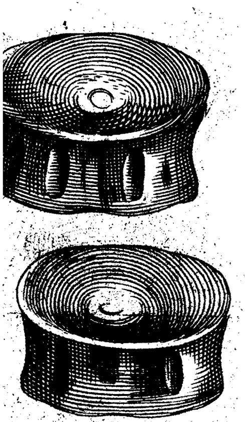

La vana ſpeculatione diſingannata dal ſenſo : Lettera Riſponſiva circa i Corpi Marini, che Petrificati ſi trovano in varij Luoghi Terreſtri.

Di Agoſtino Scilla Pittore Academico della Fucina, in Napoli, 1670. 4to.

With ſhort Notes, by a Fellow of the Royal Society.

IT will not, I ſuppoſe, be wondred at, that a Book which has been ſo long printed, ſhould now be taken notice of in theſe Tranſactions, ſince it appears to be ſo little known, even by thoſe who have written upon the ſelf-ſame Argument, that ſome late Writers who ſeem to have omitted nothing that Nature and Books could help them to, to carry on their Work, ſeem never to have ſeen it. Otherwiſe in all probability they would have named this Author, among thoſe who have taken pains to prove, that the Shells, or Stones in likeneſs of Shells which are found up and down upon the Surface, and in Hills and Quarries of the Earth, were once real coverings of incloſed Fiſhes, or have been formed in thoſe Shels which were inſtead of Molds to the liquid matter that got in after the Fiſhes were conſumed. This *Signior Scilla* has not only taken pains to prove, but has brought more Arguments in proof of it, than had been brought by thoſe that appeared upon that Subject before him.

His way of Writing ſhews little Art, and leſs Learning, which he owns himſelf a Stranger to, being by Profeſſion a Painter of *Meſſina*, who delighted much in deſigning and painting all Rarities of Nature which were brought to him, or which he could collect. The great variety of Shells found either in the neighbouring Hills, or brought to him from *Malta*, led him into a diſpute with ſome *Virtuoſi* of his acquaintance, concerning their Original: Some aſſerting that they were formed at firſt by a plaſtical power in the Earth; he on the contrary being of Opinion, that they were real Shells thrown by an Inundation, at one time or other, upon the Earth: The proving of which Aſſertion is the ſubject matter of this Treatiſe.

After a great deal of prefacing ſpent in Verboſe Civilities, after the manner of Modern *Italian* Writers, he begins to enquire into the generation of Minerals and Metals, which he believes to be generated by a penetrating Juyce or Vapour ariſing out of the Bowels of the Earth, which alters and turns all manner of Earths into it ſelf. So that if in Alum works (for example) after they are exhauſted, Sand, or Gravel, or Dirt be thrown into the Pits from whence the Alum was dug, by the penetrative and alterative quality of the Aluminous Vapour, they will by degrees be changed into ſuch a ſubſtance as had before been dug out of the ſelf-ſame place. He ſays he has found Clods of Earth and Gravel which have been ſo put in, which as they have been more or leſs diſtant from the fountain of Allum, from whence theſe Vapours did exhale, were more or leſs impregnated with Alum: Nay he pretends that by breaking ſeveral of theſe Clods whilſt they were thus digeſting, he has diſcovered the ſteps by which Nature works in the whole proceſs of this Maturation.

The Foſſil Salt in the Mountains of *Ragalmuto* in *Sicily* is in his Opinion made after the ſame manner; for after the Peaſants have wrought a Pit, if they fill it up again with the looſe Earth which they find hard by, in a ſhort time it will be ſo condenſed and purified, that for brightneſs it will not be diſtinguiſhable from that which was dug out not long before. After which manner alſo he ſuppoſes that the harder Minerals are produced.

This Hypotheſis is advanced in order to what he has to ſay concerning the original of thoſe Shells and formed Stones which are found upon the Earth; thereby to invalidate the Argument of thoſe who pretend that they are formed by a vegetative Virtue in that particular Soil, which determines them to that peculiar and regular ſhape: To which he now proceeds.

He begins with ſuppoſing that *Malta*, from whence the greateſt quantity of theſe ſuppoſed Petrifactions come, was made an Iſland, as we now ſee it, ſome time after the Creation; and that it was once a heap of liquid Mud repleniſh'd with Shells, Teeth, *&c.* which (as he afterwards explains himſelf) ſettling promiſcuouſly according to its Gravity, hath made that Iſland a heap of Earth, Stones, Shells, Teeth, and the like, as now we ſee it.

He ſuppoſes that this Collection of Matter was occaſioned by a Flood, let the Cauſes of that Flood have been what they will, either an irruption of the Ocean into the *Mediterranean*, or an inundation of the *Tuſcan* Sea driven that way by vehement Winds, or any other Cauſe aſſigned by Authors; which (namely that the preſent ſtate of the Iſle of *Malta*, was cauſed by a Flood) being granted, he thinks he may be allowed to affirm, that which every Mans Reaſon muſt acknowledge to be highly probable, namely that an infinite variety of things which were born up by the violence of the Waters were carried along by them, ſome to one place, and ſome to another.

But to this his Adverſary objected, that formed Stones have been frequently found, ſuch as the *Bucardites* of *Imperati*, and others like ſome ſort of *Turbens* or *Periwinkles*, which being all of a hard ſtony ſubſtance,

could

could never have been Shells. Theſe, ſays he, are made of Mud condenſed in Shells, which were the Molds in which theſe Stones were formed: and therefore we need not be at a loſs to conceive how theſe Stones ſhould ever contain an Animal within them, ſince they took the place of the Animal that was waſted away, whilſt they were only liquid Paſte, which hardning afterwards would retain their Form, when the Cruſt that covered them, and that gave them their ſhape, was mouldred away.

And whereas it was further objected, that great quantities of Shells are found in *Malta*, which are foreign to thoſe Seas: That (ſays he) is of no force, ſince it is well known that every *South-Eaſterly* and *Eaſterly* Wind throws whole Boat-loads of beautiful Shells upon the *Calabrian* Coaſt, none of which kind of Shell-Fiſh are ever taken by Fiſhermen upon thoſe Seas.

Now he comes to particulars. He begins with the *Lapides Bufonitæ*, which he proves to be the true Grinders of the *Sargus Dentex* and *Aurata*, and other Fiſhes of that Tribe, which have round *Dentes Molares*, to grind the Shells that they find at the bottom of the Sea, that they may come at the Fleſh upon which they live. Now to make this beyond conteſt, he produces the natural Jaw-bones of theſe Fiſhes, with their Teeth within them; and compares thoſe Teeth with the *Bufonitæ*, of which there are as many ſorts, as there are ſpecies of Fiſhes, which have round, hard Jaw-Teeth. (*a*).

The great Numbers of *Gloſſopetræ* ſent to him from *Malta*, ſome intire, ſome corroded at the Root which never had a Cruſt over it, ſome bruiſed, ſome whole, do as plainly ſhew their Original as the *Bufonitæ* did before: For upon comparing he finds that they are not ſo much *very like to*, as the *very ſame* with the Teeth of Sharks and other Fiſhes of the Dog-kind. Nay he appeals to the Senſes of all Mankind, whether great Numbers of *Teſtaceous Subſtances*, that he is ready to produce, taken out of Mountains and Rocks, were not originally coverings of Animals of their reſpective kinds, ſince the very bruiſes which they received by the weight of the Ambient Matter, as it grew harder, and conſequently preſt more heavily upon them, are ſtill plainly viſible. Some of the *Echini* being robbed of their Prickles, and looſned in their Joints, which being naturally membranous, eaſily part, being corroded by the humid [and perhaps acid] ſubſtance in which they lay. (*b*).

And whereas it may be objected, that theſe *Shells* may *grow by little and little*, and conſequently ſome may be tenderer than others,as not being exactly formed; he ſays he can ſhew Lumps of Stone exceſſively hard full of *Conchæ*, *Turbens*, *Scallops* and the like, where, within ſome of them, all the parts of the Animal it ſelf may be diſtinctly obſerved ; which is not ſo very rare neither, but that he has ſeveral times obſerved it. This, ſays he, puts the Original of theſe Shells out of doubt ; ſince they hapned to be cloſed before the liquid Mud could get in and corrode the included Animal, and afterwards harden into the exact form which its Matrice muſt of neceſſity give it : Whereas the others being firſt filled with Mud, which hardned into a ſtony conſiſtence after the Animal was quite waſted, gave occaſion to ſome Perſons who had not ſeen great varieties of Shells and formed Stones of that ſort,to doubt of their Original.

He reaſons alſo from the ſeveral *Lamellæ*, of which theſe Land-ſhells are compoſed, which are coated over one another in ſuch a manner, that they may be parted into very thin and ſubtile Plates, ſuch as Sea-ſhells of that kind are made up of.

But it was objected, that in thoſe Beds where theſe Shells are found, generally ſpeaking, moſt of one ſort are found together, from whence it has been concluded that they are firſt formed in thoſe Beds where they are found. Whereas he pretends that this proceeds only from the Motion into which the Waters were put during the Deluge; it being well known that if Egg-ſhells, Straws, Pebbles, Shells and ſeveral other diſſimilar ſubſtances be put into a great quantity of Water, and this Water be afterwards moved violently and irregularly, thoſe diſſimilar Bodys will after a great many Shocks and impediments, upon the ſettling of the Water, ſubſide according to their Figure pretty nearly together, and conſequently will be thrown into great Heaps, ſome here, ſome there, according to that determination which the rolling of the Waters gave them.

The Places where theſe ſeveral Subſtances are thus ſeparately found, are as he thinks invincible Arguments in proof of his Opinion. The Soil of *Malta* is Marl, which is a natural Balſam for the *Gloſſopetræ*, that otherwiſe would have been ſoon waſted in looſe Sand. Beſides, *Malta* lies low if compared with the Mountains of *Sicily*, ſo that 'tis no wonder that Sharks Teeth, which are heavy Bodys, ſhould firſt ſubſide, and conſequently be found there in great quantities, whereas with all his diligence, Signior *Scilla* could never find but five upon the *Sicilian* Mountains, and thoſe extreamly thin, and without any Oſſeous Matter within them, but filled with a light and ſubtile Matter; tho' he does not queſtion but in time he may be able to find, at the foot of theſe Hills, ſome *Gloſſopetræ* which may equal thoſe of *Malta*.

And this, according to him, is the Reaſon why in *Malta* it ſelf, the *Echini* and *Echinitæ* are chiefly found upon the ſtrand and above ground in view, all round the Iſland; for they are both lighter than the *Gloſſopetræ*, and by reaſon of their Figure would more eaſily float and be buoyed up upon the Water, whereas the *Gloſſopetræ* being both ſpecifically heavier, and of a cloſer contexture of parts, ſunk deeper into the Earth.

But if there were no other Argument, the ſituation of the *Gloſſopetræ* in their Beds from whence they are dug, puts their Original out of controverſie: Midling ones here, ſmall ones there, great ones in a third place, without any ſort of order and regularity: Some with their Roots uppermoſt, others directly downwards, others acroſs: vaſt numbers broken, every one with a different Inclination, all plainly proving how they firſt came thither, ſince had they grown there at firſt, their Roots would have been all downwards, unleſs we ſhould frame to our ſelves a different Notion to the Production of *Gloſſopetræ*, from any thing elſe in Nature that is generated and increaſed from ſome one fixt Seminal Principle. And, beſides, were there ſuch a ſeminal Principle, 'tis not likely that it ſhould be common to *Gloſſopetræ* and *Shells* too; and yet *Shells* of all ſorts, and in all poſitions are very often found in the Clay amongſt theſe *Gloſſopetræ*.

It is objected however, that the *Gloſſopetræ* may be eaſily taken out of their Beds by their Sides, or at the Point; whereas at the *Baſe* they adhere very cloſely, from which there often comes forth a plain Root, which is oftentimes longer than the *Gloſſopetra* it ſelf. This, ſays Signior *Scilla* is a plain proof of my Aſſertion. For that Root is not made by Nature to *ſuck out* [or *rather convey*] any nutritive juyce into the *Gloſſopetra*, from the Mud, but from the Jaw of the Shark where it originally grew. It was no wonder therefore that their ſides and point, which are naturally very hard and ſmooth, did not ſtick ſo firmly to the Mud, or Stone wherein 'twas lodged; but it would have been a wonder if the Root, which in all Sharks Teeth is very ſpongious and very porous, had not been filled with liquid Mud, that would eaſily have fixed it in its Bed, when it once began to harden. And accordingly he appeals to all that ever compared Sharks Teeth and theſe *Gloſſopetræ* together, if they be not exactly alike, ſome hard, ſome ſoft, ſome incruſtated towards the point, ſome quite thro'; with every one a ſpongious Root, where they are inſerted into their proper Muſcle.

His Adverſary had asked, *Why the Black and Aſh-coloured Conchæ and Turbens, are only found in the Chalk and Clay, and not the White ones which are dug out from among the Rocks?* To which he anſwers, That thoſe which are found in the Chalk and Clay, are not true *Turbens* or *Conchæ*, but Stones formed like them: Whereas thoſe that are found in Rocks are real Shells, which are encloſed and ſo preſerved in the Rocks. One *Turbinites* which his Adverſary had ſent to him, was a clear Evidence of this Matter. For it was molded within a Spiral Shell, which turned into it ſelf, as all the turbinated Kind conſtantly do, the inner Twirls of which Shell were preſerved entire amidſt the lapideous matter, when the outward ones had been quite worn off; from whence he poſitively concludes that all theſe formed Stones, which ſeem to reſemble Teſtaceous Animals of the turbinated and bivalvous kinds, were actually caſt in the real Shells of thoſe Animals, and were never in another form beſides that in which we now ſee them.

But 'tis objected, *Gloſſopetræ are natural Chryſtallizations of Salt*; to which he makes this reply: That then the whole ſubſtance would be all of a piece. Salt would be Salt as well within as without; a Granate and a Topaz is a Granate and a Topaz throughout: Diamonds and Rubies are Diamonds and Rubies all over: they are aggregates of ſimilar Particles which compoſe the whole Maſs, be it greater, or be it leſs; whereas theſe *Gloſſopetræ* (*c*) like all other *Vegetables*, are made up of various and diſſimilar Corpuſcles, put together in ſuch a manner, as is peculiarly ſubſervient to the end for which they were made. Accordingly the *Cortex* is of one

Subſtance, and the *Medulla* of another, and that lodged in proper Cells, with a Root diſtinct from them both; (*d*). Beſides, ſays he, Nature ſometimes produces monſtrous and defective things. An Animal ſometimes wants a Limb, a Tree is without ſome principal Branches, a Fruit may want ſome of its chiefeſt parts, Yet ſtill we may obſerve that Nature ſupplies and covers that defect with a Skin, or Bark, or Rind, ſo that it never appears torn off or rent to the naked Eye, as it would, if it were torn off by a Hand, or cut off with a Knife. This is Natures conſtant courſe; which evidently ſhews that the *Luſus Naturæ*, (as theſe are erroneouſly called) were never produced in the Earth; ſince all the bruiſes and fractures, which they have met with, are apparent without any diſguize to hide them, as Nature always employs to hide the Effects of her own irregular Productions.

He argues likewiſe from the Beds in which they are found, wherein, Gravel, Clay, Teeth, Bones, Shells of all ſorts lay confuſed in one Maſs. As alſo from the impreſſions which they leave behind them in the Marl, even to the minuteſt Lines and Craks in the Tooth, which appear exactly in both, like an Impreſſion upon Wax, and the engraving on the Seal which made it. The *Apophyſis* alſo, or *Proceſſes* in the *Gloſſopetræ* demonſtrate their Original, were there nothing elſe; ſince they exactly anſwer to thoſe in Sharks Teeth, whereby every Tooth is inſerted into his Neighbour in the living Animal; with thoſe parts porous, and thoſe ſpongious that are ſo in the Tooth of the Fiſh. Nay whereas Sharks Teeth are mortiſſed into one another [illegible]uch a manner, that a man may eaſily tell which belongs to which ſide, which lie near the Throat, which near the Snout, which lie to the Right, and which to the Left. And whereas in a Sharks Jaw, the Teeth on the Left Side will not fit on the Right, nor thoſe above ſerve below; ſo that upon ſeeing a Tooth, one may tell which Side, and what Jaw it belongs to: He has obſerved every one of theſe things in his *Gloſſopetræ*, which punctually anſwer in every part to the ſeveral ranks of the Teeth of living Sharks. His Cuts at the end of his Book, which are very beautiful, make theſe Arguments of his, very convincing.

He has drawn a piece of Marl, wherein a *Gloſſopetra*, a *Lapis Judaicus* (*e*), a *piece of a Scallop-ſhell* that would part into *Lamellæ* like the Sea-ſhells of that kind, and *a rotten peice of Bone* lie all confuſedly by one another.

He produces the Cruſt of an *Echinus Spatagus* lying in its Bed of Marl, which within was filled with Marl, and incruſted with it without. This Shell meeting with an accidental preſſure, was crackt; theſe cracks do clearly ſhew that it was an original Shell, and alſo the Reaſon how it came to be ſo crackt; ſince thereby it appears that the Shell yielded as far as the incloſ'd Marl would give it leave. And whereas it has been objected that *Echini Spatagi are very rarely ſeen, and yet that great Numbers of this Species of Echinitæ have been found in* Malta: This to Signior *Scilla* is no objection at all, he himſelf having in leſs than an hours time taken them up by hundreds in the Port of *Meſſina*.

He produces an *Echinites* whereon appeared the five Lines from one common Centre, within which, upon breaking it, he found five correſpondent Cells, and the place for the Mouth exactly agreeing to an *Echinus* taken out of the Sea.

He produces likewiſe part of a Jaw-bone of a *Dog Fiſh* lying in a Bed of Stone, with three Teeth in it: Tis partly rotten, partly ſound; porous with Channels for the Marrow in the midſt, covered without with a hard oſſeous Cruſt, peculiar to the cartilagineous kind:

Upon the ſame Bed there are alſo little Shells, and many round Knobs proper to that ſort of *Dog-Fiſh*, (*f*) which ſeem to be beginning Teeth, called by the *Malteſi*, *Serpents Eyes.*

From theſe Obſervations our Author proceeds to philoſophize upon the Phænomena; and taking it for granted that theſe Land-ſhells are the remains of a Deluge, he enquires into the contexture of that Soil wherein they are chiefly found. His Habitation being at *Meſſina,* gave him better opportunities to make his enquiries there: In purſuance of which he obſerves that the Mountains near that City conſiſt of *Strata,* which lie in this Order, *firſt Gravel, then midling Sand, then very fine Sand:* That the Lines deſcribed by theſe *Strata,* are all *Horizontal,* with a ſmall declivity towards the Sea; which declivity going thro' all the *Strata,* proceeds in his opinion from the original inclination of the Floor or Baſis on which theſe *Strata* were at firſt laid: That *after three Layers* of Sand and Gravel of different fineneſſes, *come three other Layers* in the ſame Order with the former; firſt Gravel, then coarſer, then finer Sand again, and ſo on ſeveral times one after another.

This he ſuppoſes to have proceeded from repeated Tides: From whence he concludes, that the Water coming with great violence, ſuſtained whatſoever came in its way; but upon its going off, the force abating, it let fall the terreſtrial matter that ſubſided according to its ſpecifick Gravity; and that theſe repeated flowings and ebbings of the Water hapned during ſome one very great Inundation, the Time whereof, or its Cauſe, he does not determin.

He obſerves that theſe Shells are not found certainly in ſuch or ſuch particular places, but caſually ſome here, ſome there, juſt as the rolling of the Waters hapned to carry them, and accordingly they ſubſided, where-ever the ſtrength of the Waters Motion, by which they were buoyed up, abated.

He ſays that all the Hills about *Meſſina* are not made up of ſuch looſe Sand, ſome conſiſting of a hard Rock, others of a white *Tophus*, or a dirty Marl; in all which one may obſerve either the former Order of the *Strata*, or horizontal Lines of different Bodies and different Colours.

He obſerves that the Land-Shells differ in hardneſs and conſiſtency according to the Matter in which they lie: An *Echinus* petrified in a *Tophus*, is not ſo hard as another *Echinus* petrified in a Rock; ſo that according to the diſpoſition of the ambient Matter, they acquired a greater or a leſs degree of hardneſs; and in ſome they continued juſt as they were at firſt; all which he urges to ſhew, that theſe Land-ſhells could not be Petrifactions made in Water, according to the common Notion of the Word.

Having thus laid down his Hypotheſis, he ſubjoins ſeveral of his own Obſervations; which (as he ſuppoſes) put this Queſtion beyond Diſpute.

I. He obſerves, that there are no *Sharks Teeth* found any where at Land but in *Malta*; the *Gloſſopetræ* in other places are ſmall, or light the Cortices of large ones. This he reſolves into ſpecifick Gravity, and the different make of Sharks Teeth, of which ſome are quite hard, others only cortically ſo; theſe laſt are filled with a mucilaginous juyce; ſuch were thoſe three that he found upon the Hills near *Meſſina*, which were filled with fine ſoft Marl, inſtead of that Mucilage wherewith they had been naturally repleniſhed.

II. He broke great Numbers of petrified *Echini*, and other Bodies naturally hollow, which were filled only with ſuch Marl as that they lay in, or elſe fragments of Shells, Sand, Pebbles, Spines of the *Hyſtrix Marinus*, and ſuch like ſtuff. And he affirms that he nor no Body elſe did ever ſee within theſe Shells any thing but what might get in at the Mouths of the *Echini*; which ſhews, that after the Membranes which cloſed the Mouths of the *Echini* were worn, thro' the Chalk, and other little Bodies mingled with it, got in and filled the Cavity, now void by the wearing away of the Body of the Shell-Fiſh it ſelf.

III. He examined the petrified Vertebres of the Spines of Fiſhes, which he found exactly to correſpond in their ſeveral Articulations both into each other, and into the Ribs which iſſue from them, with real Vertebres of Fiſhes found at Sea.

IV. He examins ſome *teſtaceous Bodys*, that he found in *Calabria*, which exactly anſwer to the *Dentales* of *Aldrovandus*, and according to him, are found only in hollow Stones at the bottom of the Sea, unleſs they are at any time thrown upon the Shore by great Waves.

V. He produces the Claw of a Sea-Crab found in the Hills near *Meſſina*, with a piece of a Scallop-Shell clutch'd within it.

VI. Alſo a Stone in which pieces of Coral, and all manner of Shells were diſorderly petrified, as chance had laid them, and in ſome the Animal it ſelf petrified within, ſo that one might diſcern the ſmall interiour Membranes proper to each Shell. Others in the ſame Bed, were full of the Matter in which they lay: others half full of a pellucid *Flour* like Cryſtal; others again had a ſediment of turbid Matter; all which Spars and Sediments, let the poſition of the Shell, which contained them, have been what it would, gravitated at firſt exactly towards the loweſt part of the Shell, as it was there ſituated; which plainly ſhews that they once were fluid, and carried thither by their own weight.

VII. He produces pieces of petrified Coral, which tho' they had loſt their Red Colour on the outſide, yet had a reddiſh tincture within, as all that Species of Coral has; from whence he concludes, (1.) That Time had begun to deſtroy them. (2.) That the

Accidents of the place rather concurred to their Deſtruction than Generation.

VIII. As alſo pieces of Fiſtulous Coral, which tho' they were broken in the *Tophus*, yet might be put together juſt as they were naturally joyned together in the Sea.

IX. Together with ſome of the *Joynted Coral* of *Imperati*, which reſembles the *Shank-bones* of Animals; this alſo joynted right, tho' the pieces were found apart in the *Tophus*.

X. He compared ſome of the *Echini Spinis longiſſimis* of *Aldrovandus*, with the Shells of thoſe *Echini* found at *Meſſina*, and in *Malta*; and he found them to agree exactly. He obſerved the ſame ſituations and dimenſions of the *Mammillæ*, and the *Spines* which turn upon them, as upon a *Pivot*; and when broken, the ſame Ligatures of every part of the Cruſt, which covers the Animal.

XI. He produces one *Echinus*, bruiſed in the *Tophus* in which it lay, wherein after he had waſhed off the tophaceous particles that it was filled with, he found ſeveral of the *Spines* that had formerly been upon the Cruſt: As alſo a *Spatagus*, with the Prickles on, which he found in a Valley in *Calabria*.

He concludes at laſt with taking notice, that all the *Echini*, or other Land-ſhells, that he had found bruiſed upon the *Calabrian* or *Meſſineſe* Hills, or had been brought to him from *Malta*, were bruiſed by a perpendicular preſſure: This he explains thus; The Cruſt of all *Echini* has two Centers, one directly oppoſite to the other; ſo that if they hapned to lie in the liquid Mud, in ſuch a manner, as that the loweſt Center was perpendicular to the Horizon, they were bruiſed, ſo as not to loſe their circular Figure; only they were much compreſſed. If they lay on one ſide, they were ſqueezed out of that ſhape, and the Membranes of the Ligatures parted from each other variouſly, according to the variety of the ſituation of theſe Shells in the Mud at that time. All which plainly ſhews, that as the Mud dried, the ſuper-incumbent Weight preſſed perpendicularly upon the incloſed Bodies, which were then compreſſed together in that poſture they then hapned to lie in: And were more or leſs compreſſed, according as the Mud got into their Cavities in greater or leſſer quantities, and as it dried, propped them up on the inſide againſt the preſſure of the Matter in which they lay

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Short Notes upon the foregoing Account; by a Fellow of the Royal Society.

(*a*) *pag.* 4. MR *Willughby* ſays the *Sargus* has none of theſe *round Teeth*, which he calls *tubercula Oſſea*, and makes that one of the Characteriſticks to diſtinguiſh it from the *Sparus*, and *Scarus*, and other Fiſhes of that Tribe. However I retain the word, becauſe *Scilla*'s word is *Sargo*; and perhaps *Willughby*'s *Sargus* may not be *Scilla*'s *Sargo*, or, which is more probable, he might overlook that particularity in that Fiſh which he diſſected.

(*b*) *ibid.* By theſe *teſtaceous Subſtances*, which he here ſpeaks of, he means the *Cruſts* of the *Echini*, of which he has given us ſo many curious Deſigns in the annexed Figures. He ſeems to think that the *Echini Marini* are of the *teſtaceous Kind*, as alſo ſeveral very great Naturaliſts have thought before him. *Geſner*, after *Ariſtotle*, in his *Nomenclator Animantium Aquatilium*, ranges them with the *Conchæ*, *Cochleæ*, *Scallops*, *Purpuræ*

puræ, and the reſt of the *teſtaceous Tribe*; and yet he owns that *Rondeletius* reckoned them among the *Cruſtaceous Kind*, and accordingly diſcourſed of them after *Crabs* and *Lobſters*, juſt before he treated of thoſe Animals, which are confeſſedly *teſtaceous*; wherein he followed *Pliny*, who was of the ſame Opinion before him. And they certainly were in the right, tho' for want of ſtating the true difference between a *Cruſt* and a *Shell* properly ſo called, the due place which the *Echini* ought to hold in a *Natural Hiſtory of Shellfiſh*, as the word may comprehend both Kinds, has never yet, that I know of, been aſcertained.

A *Shell* properly is ſuch a hard Subſtance, as covers an entire Animal, or at leaſt one whole ſide, without Joynts or Ligatures, as in *Buccina*, *Purpuræ*, *Murices*, *Oyſters*, *Scallops*, *Cockles*, and the like. A *Cruſt* is ſuch a hard Subſtance as covers only one particular Joynt of the incloſed Animal, ſo that in the whole *Cruſtaceous Tribe* there are as many *Shells* upon every Animal, (if I may be allowed to uſe that word in a larger ſenſe) as there are Joynts in that Animal. This is plain in *Crabs*, *Lobſters*, *Cray-fiſh*, and *Shrimps*; for which Reaſon *Cruſtaceous Animals* may truly be called *Multi-teſtaceous*, and the other ſimply *teſtaceous*, or *bi-teſtaceous*. And therefore as in *Scaly Fiſhes*, every *Scale* has a correſpondent *Muſcle*, to which, by a particular *Tendon* it is annexed; ſo all *Cruſtaceous Animals* have *particular Muſcles*, which are inſerted into every *Cruſt*; all which *Cruſts* are alſo connected each to the other by common Membranes, which here are in a more eſpecial manner neceſſary, becauſe they do not lie *imbricatim* upon one another as *Scales* do.

As plain as this ſeems to be, *Ariſtotles* definitions of *Cruſtaceous* and *Teſtaceous Animals*, or, (as he calls them) Μαλακόστρακα and Ὀστρακόδερμα have been univerſally acquieſced in; and they being inſufficient have cauſed this whole matter, (by the generality of Naturaliſts, even in this Age,) to be miſunderſtood. (1.) *Cruſtaceous Animals*, (Μαλακόστρακα) ſays *Ariſtotle*, are *ſoft within and hard without, but whoſe covering is not apt to be parted by contuſions, tho' one part of it may eaſily be torn from the other:* (So I underſtand his οὐ θραυστὸν ἀλλὰ φλαστὸν). (2.) *Teſtaceous Animals* (Ὀστρακόδερμα) are *ſoft within and hard without, whoſe covering may be bruiſed or broken to pieces, tho' its parts are not liable to be torn from each other*) θραυστὸν ὂν καὶ κάτακτον ἀλλ' οὐ φλαστόν.) The Conſequences which *Ariſtotle* puts into his Definition as Characteriſticks, neceſſarily ariſe from the Doctrine already delivered. For when that *Shell* is but *one*, as in the *whole teſtaceous kind*, it may be *bruiſed*, or it may be *broken*, according as it is more or leſs *brittle*, but *torn aſunder* it can never be. Whereas in the *whole cruſtaceous kind*, the coverings which are over every ſeveral part, as Claws, Feet, Back, Belly, and Tail in Lobſters, are joyned each to other by *Membranes*, which, tho' tough, may be *torn aſunder*, when the particular Cruſts, here as well as in the *teſtaceous kind*, cannot.

According to this Diſtinction 'tis plain, that *Echini* are truly Cruſtaceous Animals, for they move upon their Spines, which demonſtrates that their Covering is

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(1.) Μαλακόστρακά ἐστιν ὅσα τὸ μὲν στερεὸν ἐκτὸς ἔχουσιν, ἐντὸς δὲ τὸ μαλακὸν καὶ σαρκῶδες. Τὸ δὲ στερεὸν αὐτῶν οὐ θραυστὸν ἀλλὰ φλαστὸν, οἷον τὸ τῶν καράβων γένος, καὶ τὸ τῶν καρκίνων.

(2.) Ὀστρακόδερμά ἐστιν ὧν ἐντὸς μὲν τὸ σαρκῶδες, ἐκτὸς δὲ τὸ στερεὸν θραυστὸν ὂν καὶ κάτακτον, ἀλλ' οὐ φλαστὸν, τοιοῦτον δὲ τὸ τῶν κοχλίων, καὶ τῶν ὀστρέων γένος ἐστι.

moved by parts; and indeed every Spine is rivetted into its proper Cruſt, which alſo by conſequence muſt have its peculiar Muſcle, that guides the motion of the Spine, whereby the Animal rolls about which way ſoever it pleaſes. It being peculiar to this Tribe of Animals alone, for any thing yet known to the contrary, that its progreſſive motion is by *turning* or *rolling upon its Spines*, and not *walking* as all Animals, that have Feet, properly do. Which Motion of theirs (if we (3.) may believe Monſieur *Menage*) has given occaſion to an old French Proverb, *a la venue des Coquecigrües*, i. e. *when Echini walk*, by which they would intimate, that that particular thing concerning which it is made uſe of, ſhall never come to paſs.

Beſides, it is plain by ocular Inſpection, that all the *Cruſts* of theſe Animals are *united by Membranes*, as they are in *Crabs* and *Lobſters*. *Scilla's* Draughts, ſome whereof are here annexed, put this Matter out of doubt; from which it evidently appears, that *Echini* are properly *cruſtaceous Animals* in the ſtricteſt acceptation of the word.

(*c*) *pag.* 188. By *Vegetables* he means *Subſtances, which encreaſe from præexiſtent Seed*, as all Plants and Animals properly do.

(*d*) *pag.* 189. This will be fully underſtood, if one conſults *Steno's Anatomy of a Sharks-Head*, which is annexed to his *Elementorum Myologiæ Specimen*.

(*e*) *pag.* 190. Theſe *Lapides Judaici*, which Signior *Scilla* often calls *Baſtoncini di San Paolo*, or St. *Paul's Batoons*, are Spines of ſome Species of *Echini*, of which he gives the Figures, which are not found upon our Shores, and are (perhaps) of the *Pelagian* Tribe.

(3.) *Dictionnaire Etymologique.* V. *Coquecigrue.*

(*f*) *pag.*191. Signior *Scilla* calls this *Dog-Fiſh, Peſce Vacca* (the *Cow-Fiſh.*) It being deſcribed by no Naturaliſt (that I know off) before him, its hereunto annexed from our Authors Draughts, ſome of which, for their great exactneſs and curioſity, it was thought fit to Copy. *Vide Fig.*

An Explication of the ſaid Figures in the Plate, with further Remarks thereon, By another Fellow of the Royal Society.

Fig. 1. THE Head of the *Peſce Vacca*, drawn from the Life, with the Teeth in both Jaws. It ſeems to be of the long cartilagineous kind, a-kin to the *Dogs* or *Hound* Fiſhes.

Fig. 2, 3, 4, 5, 6. The Teeth of the ſame out of their Sockets. Theſe are found petrified in Beds up and down the Iſland of *Malta*, with thoſe of *Dog-fiſhes, Sharks, Peſce Aquila*, &c.

Fig. 7. A Jaw of a Fiſh call'd *Dentex*, with the round grinders; the like *Dentes Molares* are obſerved and drawn by the Author in the Jaws of other Fiſhes, as the *Aurata* and *Sargus*, with ſeveral *Bufonitæ* lying by them. Theſe convex oſſeous Tubercules are found commonly petrified in *Malta*, and are call'd there *Serpent's Eyes* They are of the ſame kind with our Engliſh *Bufonites* or *Toadſtones*, which Dr. *Merret* firſt declared to be the round Jaw Teeth of the *Lupus Marinus* or *Wolf Fiſh* of *Schonfeld.* See Mr. *Rays Travels*, *p.* 321. Theſe *Bufonitæ* are properly call'd by Mr. *Lhwyd, Ichthyodontes Scutellati. Philoſoph. Tranſact.* N. 200. p. 751. Fig. 19.

Fig. 8. The petrified Teeth of *Dog-Fiſhes* and *Sharks*, (call'd *Gloſſopetræ*) lying in ſeveral poſtures and ſituations in their Beds of Earth. Theſe, with all the foregoing, may be reduced to Mr. *Lhwyd*'s *Claſſis* of *Ichthyodontes*.

Fig. 9. A *Sea Vrchin*, with long Prickles, *Hyſtrix Spinis longiſſimis Imperati*. The Fiſhermen of *Sicily* often brought it alive to the Author. The Spines break off, and are eaſily disjointed. Of the *Echinites* the Author hath drawn above 18 Species.

Fig. 10. A *Sea Vrchin* found petrifi'd (*Echinites*) in white Stone, on the Rocks and Hills near *Meſſina*, with ſome ſtony Spines or Prickles lying by it; The Teats or Pivots (on which they have been inſerted) lie naked and broken off. See Mr. *Ray*'s *three Phyſico Theological Diſcourſes*, Tab. 3. pag. 162, 163.

Fig. 11. A maſs of petrifi'd *Sea Vrchins*, one entire, another bruiſed, with the ſtony Prickles broken off, and lying by in the ſame *Bed*; there may be as many *Species* of this ſort of figur'd Stones, or petrifi'd Spines, as there are of the *Echini Marini* themſelves; ſome ſhort, thick, roundiſh, and cannulated (as the *Lapis Judaicus*) other long, ſlender, tuberculated, and ragged (as St. *Paul's Batoons* in *Malta*) all belonging to the ſeveral *Echinitæ* and *Ombriæ*. See the *Riccio Marino in Pietra*, *Imperati Iſtor. Natural. Venet. edit.* 1672. p. 586. and his Chapter *delle Pietre Giudaiche*, pag. 575, 576. Theſe may come within the *Claſſis* of the *Spondylites*.

Fig. 12, 13. Petrifi'd *Vertebres* with their Articulations and Inſertions, with the Ribs, See *Fig.* 13. Theſe may be reduced to Mr. *Lhwyd*'s Tribe of *Ichthyoſpondyli*; for Stones reſembling Vertebres, and other Bones of Fiſhes, See Mr. *Ray*'s *Travels*, *in the Preface*, and p. 116, 294. The *Entrochi* and *Aſteriæ* come under this diviſion.

Fig. 14. Petrifi'd *Dentalia* and *Cochlites* found lying in the ſame Bed, in the Rocky Mountains of *Calabria.*

N. B. That Dr.*Robert Hooke* publiſh'd ſome Obſervations upon this Subject in his *Micrographia*, p. 109, 110, 111,112. and afterwards diſcourſed of it at large in ſeveral of his publick Lectures in *Greſham College* (which the Publick have long expected, and ſtill deſire from him) before *Steno, Scilla,* and *Boccone*, communicated their curious Obſervations to the World. See *Philoſoph. Tranſact.* N. 32. pag. 628. alſo N. 72. pag. 2186 to pag. 2190. See M. *Denis his Memoirs and Conferences,* (printed with the *Journaux des Seavans*) An. 1672. Mem. I. Alſo the Italian *Giornate di Literati Ephem.* 5. of the ſame year. See Dr. *Hook*'s *Lecture upon Springs* pag. 48, 49, 50. But above all, Juſtice is to be done to that Noble Natural Philoſopher *Fabius Columna,* who hath two admirable Diſcourſes upon the ſeveral parts of *Aquatick* and *Terreſtrial Animals,* as alſo of *Plants,* which he himſelf obſerv'd to be dug up in the Mountains of *Andria, Apulia,* and other Places; and thereupon remarks how they were left there by the *General Flood*; why in ſome places they remain uncorrupted, in others waſted, and mouldred, in others only by their impreſſed Figures, and exact Forms. That they all anſwer in every delineation, and every part the very *Bodies* they reſemble, and are truly the very ſame *Species*. See *Columna* in his *Obſerv. Aquat.* & *Terreſtr.* Cap. 21. pag. 43 to pag. 55. Alſo *de Purpura, Diſſertat. de Gloſſopetris,* pag. 31 to pag. 39. 4to *Romæ impreſſ.* 1616.

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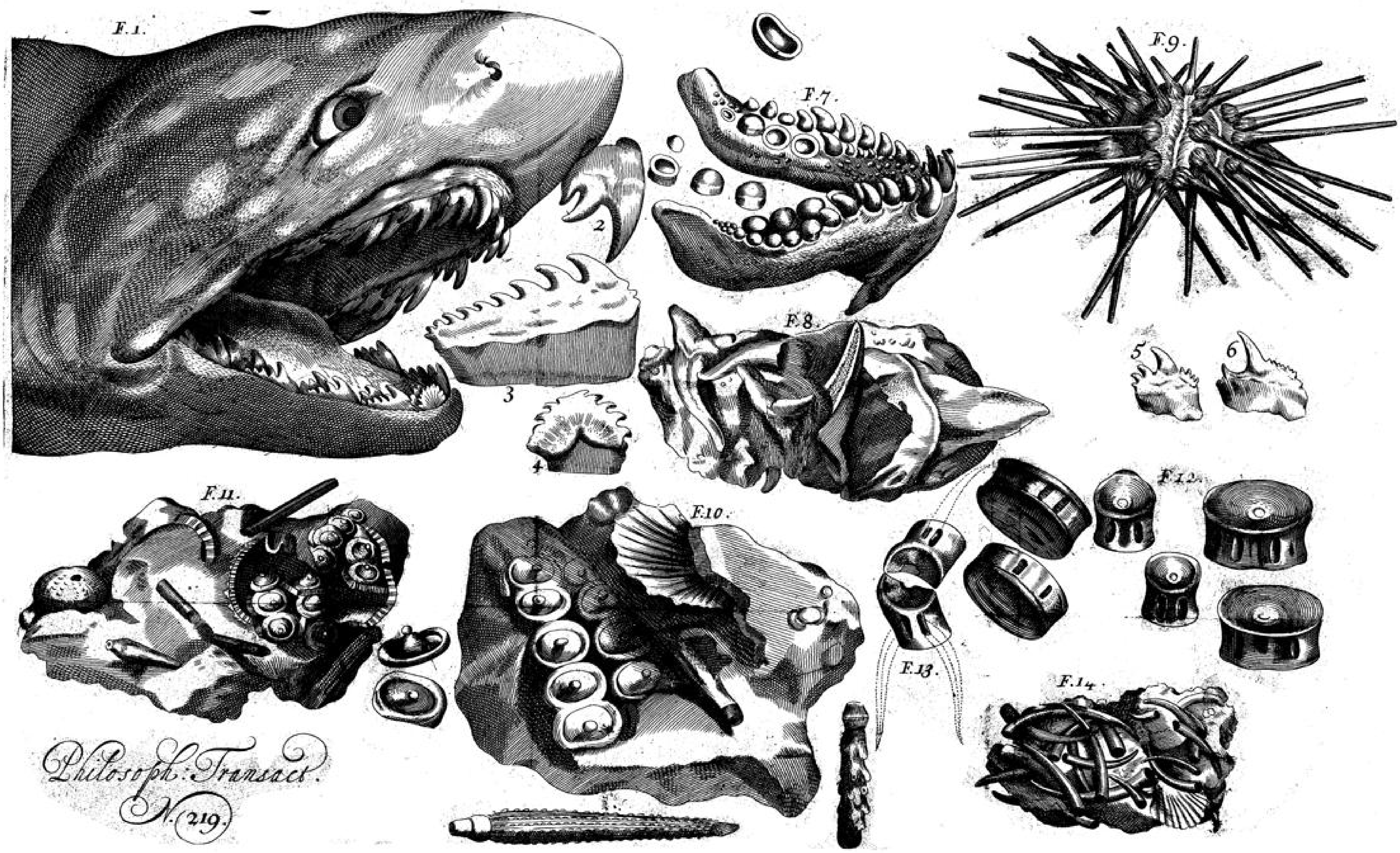

Philoſoph: Transact.
N. 219.